

WHAT IS CLAIMED IS:

1 1. A liner retention system for a reciprocating pump having a piston and a piston rod
2 operating in a cavity of a frame, which system comprises:
3 a cylindrical liner for said piston and said piston rod, said liner having a radially
4 extending external shoulder;
5 a liner clamp plate having a central opening receivable over said liner and a plurality
6 of stud apertures;
7 a plurality of studs extending from a module block, each said stud terminating in a
8 threaded end spaced from said frame;
9 at least one compression sleeve having an inside diameter larger than an external
10 diameter of said stud extenders; and
11 a tensioner to secure each said stud to said liner clamp plate and to thereby secure said
12 cylindrical liner to said module block.

1 2. A liner retention system as set forth in Claim 1 wherein said tensioner is a multijack
2 bolt tensioner.

1 3. A liner retention system as set forth in Claim 1 wherein at least one said stud includes
2 a stud extender.

1 4. A liner retention system as set forth in Claim 3 including two said stud extenders and
2 two said compression sleeves.

1 5. A liner retention system as set forth in Claim 1 wherein said liner clamp plate central
2 opening has a diameter less than a diameter of said radially extending external shoulder.

1 6. A liner retention system as set forth in Claim 1 wherein said cavity in said frame is
2 closed on five sides.

1 7. A liner retention system as set forth in Claim 1 including a hardened washer between
2 each said compression sleeve and each said tensioning means.

1 8. A liner retention system for a reciprocating pump having a piston and piston rod
2 operating in a cavity of a frame wherein said cavity is closed on five sides, which system comprises:
3 a cylindrical liner for said piston and said piston rod, said liner having a radially
4 extending external shoulder;

5 a liner clamp plate having a central opening receivable over said liner wherein said
6 central opening has a diameter less than a diameter of said radially extending shoulder;

7 a plurality of studs extending from a module block, each said stud terminating in a
8 threaded end spaced from said module block, including a pair of stud extenders;

9 a pair of compression sleeves having an inside diameter larger than an external
10 diameter of said stud extender; and

11 a tensioner to secure each said stud to said liner clamp plate and to thereby secure said
12 cylindrical liner to said module block.

1 9. A method to secure and retain a cylindrical liner for a reciprocating pump to a frame,
2 which method comprises:

3 inserting said cylindrical liner in an opening within a cavity of said pump frame;
4 sliding a liner clamp plate over said cylindrical liner so that said clamp plate engages
5 a radially protruding shoulder on said liner and so that a plurality of studs extending from said frame
6 pass through a plurality of apertures in said clamp plate;

7 attaching a stud extender to at least one of said studs, wherein each said stud extender
8 terminates in a threaded end spaced from a module block;

9 sliding a compression sleeve having an internal diameter larger than an external
10 diameter of said stud extender; and

11 tensioning each said stud to said clamp plate so that said liner thereby is secured to
12 said module block.

1 10. A method as set forth in Claim 9 wherein said steps are performed in reverse order
2 to remove said cylindrical liner.

1 11. A method as set forth in Claim 9 wherein said tensioning each said stud to said clamp
2 plate includes threading a multijack bolt tensioner to each said stud.

1 12. A method as set forth in claim 9 including the step of reducing the number of said
2 studs tensioned through use of said method.